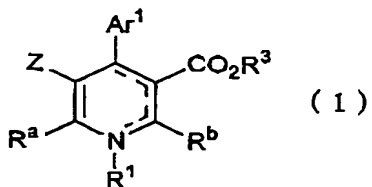


CLAIMS

1. A T-type calcium channel blocker that is a compound of formula (1), a pharmaceutically acceptable salt thereof or a solvate thereof:



wherein

Ar¹ is phenyl group, pyridyl group, furyl group or 2,1,3-benzoxadiazol-4-yl group (the phenyl group, pyridyl group, furyl group and 2,1,3-benzoxadiazol-4-yl group may be arbitrarily substituted with one or two substituents selected from NO₂, CF₃, Br, Cl, F, C₁₋₂₀alkyl group, OH, OR⁶, OCHF₂, COOR⁶, NH₂, NHR⁶, NR⁶R⁷, CONH₂, CONHR⁶, CONR⁶R⁷, COSR⁶, SR⁶, S(O)R⁶, S(O)₂R⁶, SO₃H, SO₃R⁶, SO₂NH₂, SO₂NHR⁶, SO₂NR⁶R⁷, CN and phenyloxy group, wherein R⁶ and R⁷ are independently of each other C₁₋₆alkyl group;

nitrogen-containing hetero ring moiety is 1,4-dihydropyridine ring or pyridine ring;

Z is a group of formula (2)



wherein R⁴ and R⁵ are independently of each other OH, C₁₋₆alkoxy group, C₃₋₆alkenyloxy group, C₃₋₆alkynyloxy group, OAr², OANR⁶R⁷, OAN(CH₂Ar²)R⁶, OAOR⁶, OACN, NH₂, NHR⁶, NR⁶R⁷, 1-piperidiny group or 1-pyrrolidiny group, or R⁴ and R⁵ together are OYO, NHYO, R⁶NYO, NHYNH, R⁶NYNH or R⁶NYNR⁷ wherein R⁶ and R⁷ are as defined above,

Ar² is phenyl group (the phenyl group may be arbitrarily substituted with halogen atom, C₁₋₃alkyl group or C₁₋₃alkoxy group),

A is C₂₋₆alkylene group (the C₂₋₆alkylene group may be arbitrarily substituted with C₁₋₃alkyl group or Ar²), and

Y is straight-chain C₂₋₄alkylene group (the C₂₋₄alkylene group may be arbitrarily substituted with C₁₋₆alkyl group, C₁₋₆alkoxy group, C₁₋₆alkoxycarbonyl group or Ar²), or Z is CO₂R², wherein R² is C₁₋₆alkyl group (the C₁₋₆alkyl group may be arbitrarily substituted with C₁₋₃alkoxy group);

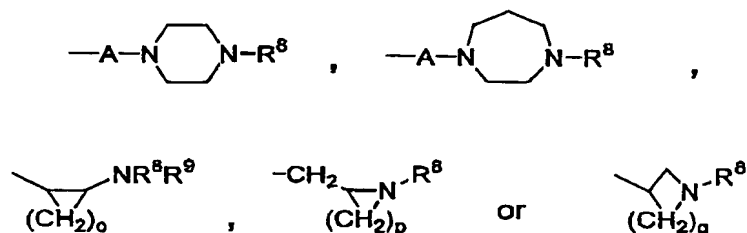
R^a and R^b are independently of each other C₁₋₆alkyl group, ANR⁶R⁹, CH₂OANR⁶R⁹, Ar²,

CH=CHAr², CH₂CH(OH)Ar², CHO, CN, CH₂OH, CH₂OR⁸, AN(CH₂CH₂)₂NR⁸ or NR⁸R⁹, wherein R⁸ and R⁹ are independently of each other hydrogen atom, C₁₋₆alkyl group (the C₁₋₆alkyl group may be arbitrarily substituted with phenyl group, wherein the phenyl group may be arbitrarily substituted with C₁₋₆alkoxy group or halogen atom) or phenyl group (the phenyl group may be arbitrarily substituted with C₁₋₆alkoxy group or halogen atom),

Ar² and A are as defined above;

in case where the nitrogen-containing hetero ring moiety is 1,4-dihydropyridine ring, R¹ is C₁₋₆alkyl group, ANR⁸R⁹, AN(CH₂CH₂)₂NR⁸, AN(CH₂CH₂)₂O, AOR⁸ or benzyl group, wherein R⁸, R⁹ and A are as defined above; and

R³ is hydrogen atom, C₁₋₂₀alkyl group, C₂₋₆alkenyl group or C₂₋₆alkynyl group (C₁₋₂₀alkyl group, C₂₋₆alkenyl group and C₂₋₆alkynyl group may be arbitrarily substituted with phenyl group, wherein the phenyl group may be arbitrarily substituted with C₁₋₆alkoxy group or halogen atom), ANR⁸R⁹ or a group of formula

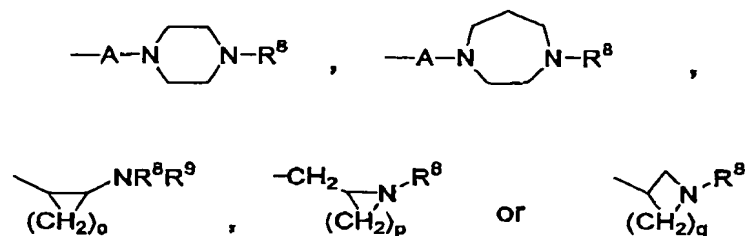


wherein R⁸, R⁹ and A are as defined above,

o and p are independently of each other 3 or 4, and

q is 1, 2 or 3.

2. The T-type calcium channel blocker according to claim 1, wherein R³ is ANR⁸R⁹ or a group of formula



wherein R⁸, R⁹, A, o, q and p are as defined above; and

R⁵ is C₁₋₆alkyl group.

3. The T-type calcium channel blocker according to claim 2, wherein R^b is C₁₋₆alkyl group, CN or NH₂.
4. The T-type calcium channel blocker according to claim 1, wherein R^b is ANR^aR^a, CH₂OANR^aR^a or CH₂CH₂N(CH₂CH₂)₂NR^a, wherein A, R^a and R^a are as defined above; R^a is C₁₋₂₀alkyl group, C₂₋₆alkenyl group or C₂₋₆alkynyl group (C₁₋₂₀alkyl group, C₂₋₆alkenyl group and C₂₋₆alkynyl group may be arbitrarily substituted with phenyl group, wherein the phenyl group may be arbitrarily substituted with C₁₋₆alkoxy group or halogen atom); and R^a is C₁₋₆alkyl group.
5. The T-type calcium channel blocker according to any one of claims 1 to 4, wherein the nitrogen-containing hetero ring moiety is 1,4-dihydropyridine ring; and Z is a group of formula (2).
6. The T-type calcium channel blocker according to claim 5, wherein R⁴ and R⁵ together are OYO, NHYO, R^aNYO, NHYNH, R^aNYNH or R^aNYNR⁷, wherein Y is straight-chain C₂₋₄alkylene group (the C₂₋₄alkylene group may be substituted with C₁₋₆alkyl group, C₁₋₆alkoxy group, C₁₋₆alkoxycarbonyl group or Ar²).
7. The T-type calcium channel blocker according to claim 6, wherein Ar¹ is phenyl group, 3-nitrophenyl group, 2-nitrophenyl group, 3-chlorophenyl group, 2-chlorophenyl group, 3-methoxyphenyl group, 2-methoxyphenyl group, 2-trifluoromethylphenyl group, 3-trifluoromethylphenyl group, 4-pyridyl group, 3-pyridyl group, 2-pyridyl group or 2,3-dichlorophenyl group.
8. The T-type calcium channel blocker according to any one of claims 1 to 4, wherein the nitrogen-containing hetero ring moiety is pyridine ring; and Z is a group of formula (2).
9. The T-type calcium channel blocker according to claim 8, wherein R⁴ and R⁵ together are OYO, NHYO, R^aNYO, NHYNH, R^aNYNH or R^aNYNR⁷, wherein Y is straight-chain C₂₋₄alkylene group (the C₂₋₄alkylene group may be arbitrarily substituted with C₁₋₆alkyl group, C₁₋₆alkoxy group, C₁₋₆alkoxycarbonyl group or Ar²).

10. The T-type calcium channel blocker according to claim 9, wherein Ar¹ is phenyl group, 3-nitrophenyl group, 2-nitrophenyl group, 3-chlorophenyl group, 2-chlorophenyl group, 3-methoxyphenyl group, 2-methoxyphenyl group, 2-trifluoromethylphenyl group, 3-trifluoromethylphenyl group, 4-pyridyl group, 3-pyridyl group, 2-pyridyl group or 2,3-dichlorophenyl group.

11. The T-type calcium channel blocker according to any one of claims 1 to 4, wherein the nitrogen-containing hetero ring moiety is 1,4-dihydropyridine ring; and Z is CO₂R².

12. The T-type calcium channel blocker according to claim 11, wherein Ar¹ is phenyl group, 3-nitrophenyl group, 2-nitrophenyl group, 3-chlorophenyl group, 2-chlorophenyl group, 3-methoxyphenyl group, 2-methoxyphenyl group, 2-trifluoromethylphenyl group, 3-trifluoromethylphenyl group, 4-pyridyl group, 3-pyridyl group, 2-pyridyl group or 2,3-dichlorophenyl group.

13. The T-type calcium channel blocker according to any one of claims 1 to 4, wherein the nitrogen-containing hetero ring moiety is pyridine ring; and Z is CO₂R².

14. The T-type calcium channel blocker according to claim 13, wherein Ar¹ is phenyl group, 3-nitrophenyl group, 2-nitrophenyl group, 3-chlorophenyl group, 2-chlorophenyl group, 3-methoxyphenyl group, 2-methoxyphenyl group, 2-trifluoromethylphenyl group, 3-trifluoromethylphenyl group, 4-pyridyl group, 3-pyridyl group, 2-pyridyl group or 2,3-dichlorophenyl group.

15. A pharmaceutical containing the T-type calcium channel blocker according to claim 1.

16. The pharmaceutical according to claim 15, wherein the pharmaceutical is a therapeutic or preventive agent against a disease for which T-type calcium channel blocking action is effective.

17. The pharmaceutical according to claim 16, wherein the disease is hypercardia,

heart failure, cardiomyopathy, atrial fibrillation, tachyarrhythmia, arterial sclerosis, nephritis, nephropathy, renal disorder, renal insufficiency, inflammation, edema, hyper-aldosteronism, neurogenic pain, epilepsy or cancer.

18. A method for preventing or treating hypercardia, heart failure, cardiomyopathy, atrial fibrillation, tachyarrhythmia, arterial sclerosis, nephritis, nephropathy, renal disorder, renal insufficiency, inflammation, edema, hyper-aldosteronism, neurogenic pain, epilepsy or cancer, comprising administering an effective amount of the compound of formula (1), a pharmaceutically acceptable salt thereof or a solvate thereof according to claim 1.

19. Use of the compound of formula (1), a pharmaceutically acceptable salt thereof or a solvate thereof according to claim 1 for the manufacture of a preventive agent or a therapeutic agent for hypercardia, heart failure, cardiomyopathy, atrial fibrillation, tachyarrhythmia, arterial sclerosis, nephritis, nephropathy, renal disorder, renal insufficiency, inflammation, edema, hyper-aldosteronism, neurogenic pain, epilepsy or cancer.